APPENDIX B. SELECTION CRITERIA FOR THE KEYSTONE POLLUTANT

The following describes the criteria used in the selection of a keystone pollutant. To serve as a good surrogate for other urban pollutants, a keystone pollutant should have the following characteristics:

1) It should have well defined adverse impacts on the Chesapeake Bay. In particular, the pollutant should have an impact on the shorelines and coves adjacent to the Critical Area where stormwater runoff can be expected to exert the greatest impact on water quality.

2) The form and behavior of the keystone pollutant should be a composite of most stormwater pollutants. That is, the pollutant should exist in both the particulate and soluble phase. For our purposes, these terms are defined in an operational rather than a strict physical/chemical manner. Thus, any pollutant that can pass through a 45 micron filter is considered soluble; whereas, any pollutant that cannot is considered to be particulate. A few stormwater pollutants are normally found in soluble form, some are in particulate form, and still others are a mixture of both. The form of a pollutant has a strong bearing on how easily it can be controlled by a best management practice (BMP), and also on how it may impact the Chesapeake Bay.

   Generally, particulate forms are easier to remove by conventional BMPs than soluble forms. However, soluble forms typically have a greater and more immediate impact on aquatic life than particulate forms. Therefore, if a particulate pollutant were to be selected as the keystone pollutant, it would be relatively easier to achieve compliance under the 10% Rule, but it would not necessarily result in adequate protection of water quality. Selection of a soluble pollutant as the keystone may result in substantially better water quality, but also would make compliance with the 10% Rule very difficult, since most current BMPs are not capable of achieving highly soluble pollutant removal.

   As a compromise, it is recommended that the keystone pollutant should be present as a roughly equal mix of both particulate and soluble forms.

3) Enough research must be available to provide a reasonable basis for estimating how keystone pollutant loads change in response to development and to current stormwater control measures. Specifically, enough data must exist to confidently predict:

   - Pre-development keystone pollutant loads.
   - Post-development keystone pollutant loads.
   - How much of the keystone pollutant load is removed by urban BMPs.
   - How much of other stormwater pollutants are removed when the keystone pollutant is removed.

The only stormwater pollutants that meet all three criteria for suitability as a keystone pollutant are: total phosphorus, total nitrogen and zinc (see Table B.1). Of these three, total phosphorus is the only one that exists in particulate and soluble forms in roughly equivalent proportions, (40/60, compared to 20/80 and 25/75, for nitrogen and zinc, respectively).

Because of its composite form, total phosphorus is a good surrogate for all stormwater pollutants. Removal of total phosphorus usually produces an equal or greater level of removal for most other pollutants, except total nitrogen. High removal rates of total nitrogen cannot be achieved with current techniques because much of the nitrogen is present in soluble forms. Consequently, the selection of nitrogen as the keystone pollutant would make widespread on-site compliance with the 10% Rule very difficult.

These data, when combined with the excellent database available for estimating the response of phosphorus to changes in development and control practices, make it the best candidate for the keystone pollutant.

Table B.1 Selection Criteria of the Keystone Pollutant

Pollutant	Well-Defined Impact on the Bay	Composite Form	Adequate Data
Sediment	yes	no	no
Total Phosphorus	yes	yes	yes
Total Nitrogen	yes	yes	yes
Coliform Bacteria	yes	no	no
BOD/ COD	yes	yes	no
Oil/ Grease	yes	no	no
Zinc	yes	yes	yes
Lead	yes	no	yes
Toxins	no	no	no